

# Groundwater Resources of the Broad Basin

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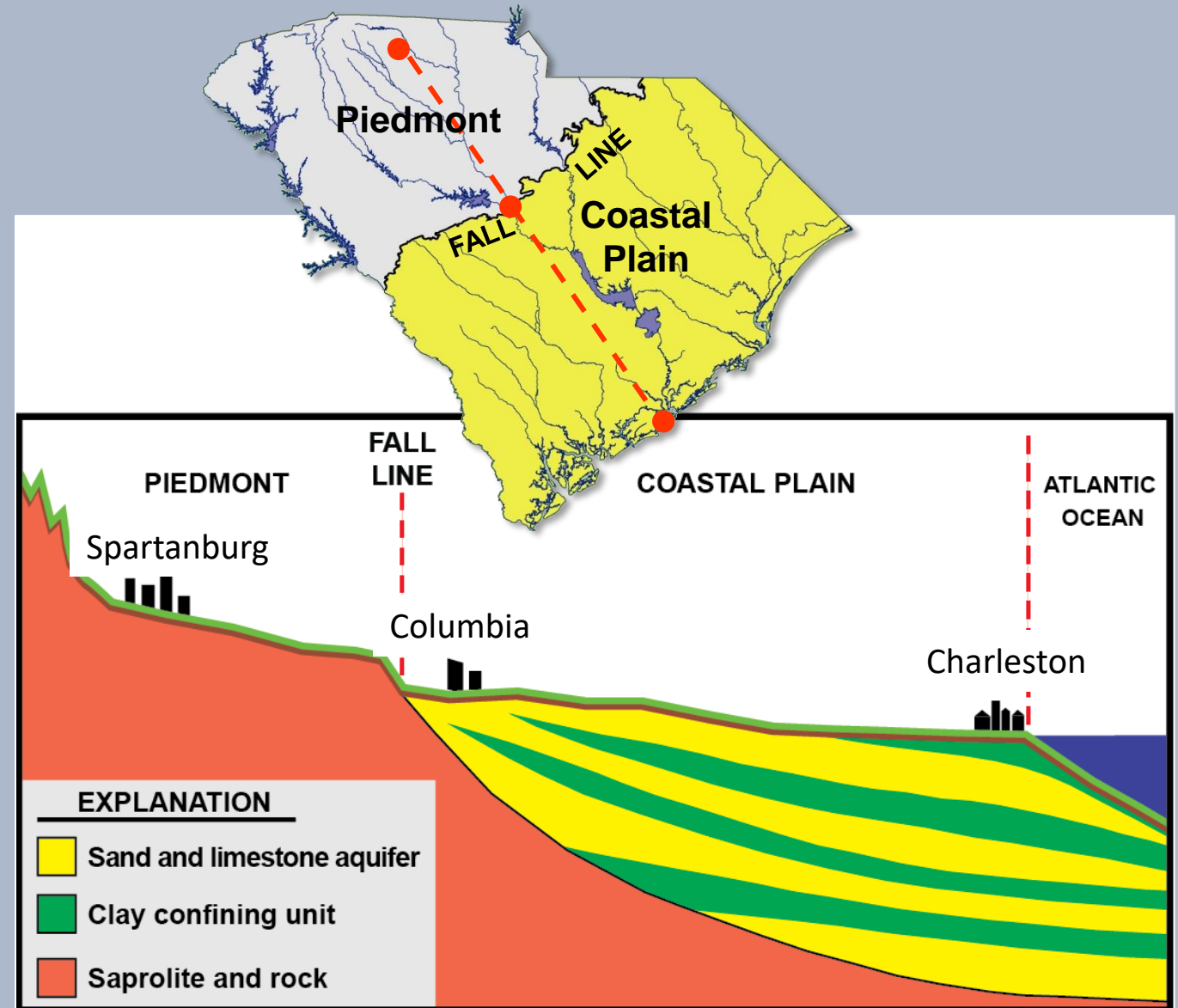
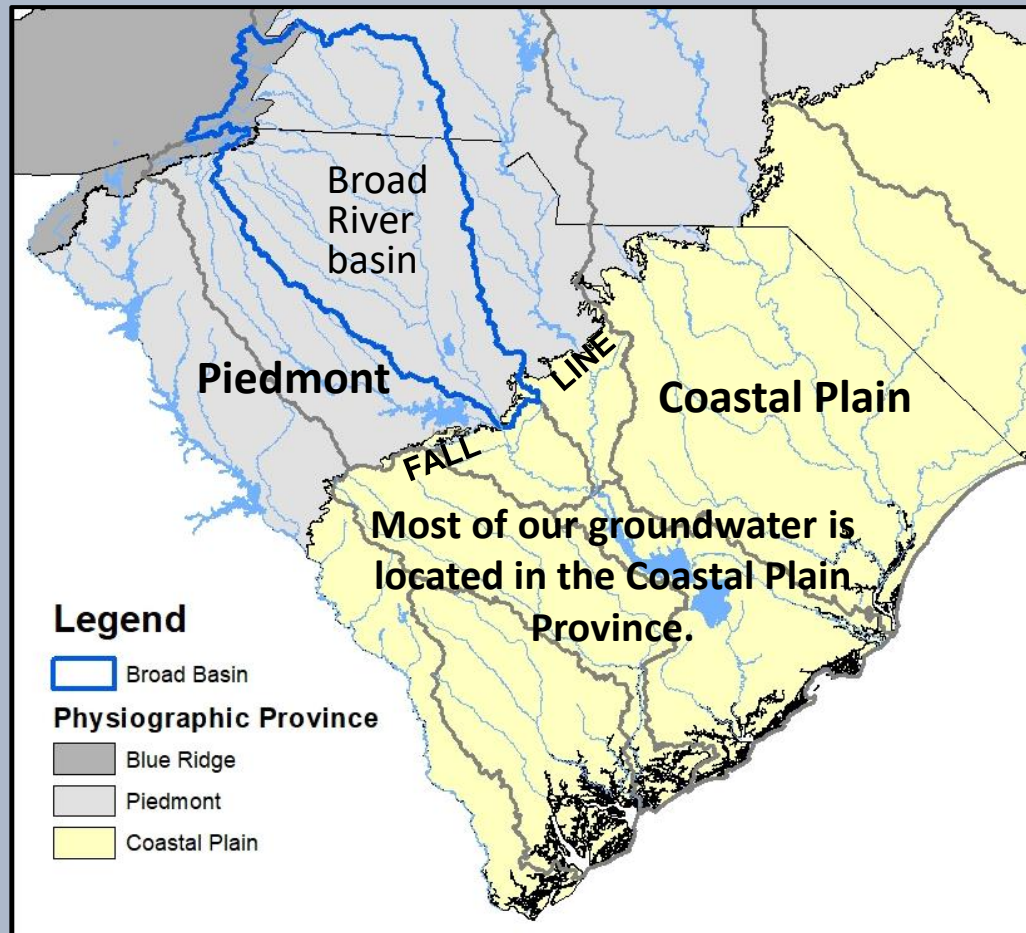
Broad River Basin Council Meeting #6

Spartanburg Community College Tyger River Campus

1875 East Main Street, Duncan, SC

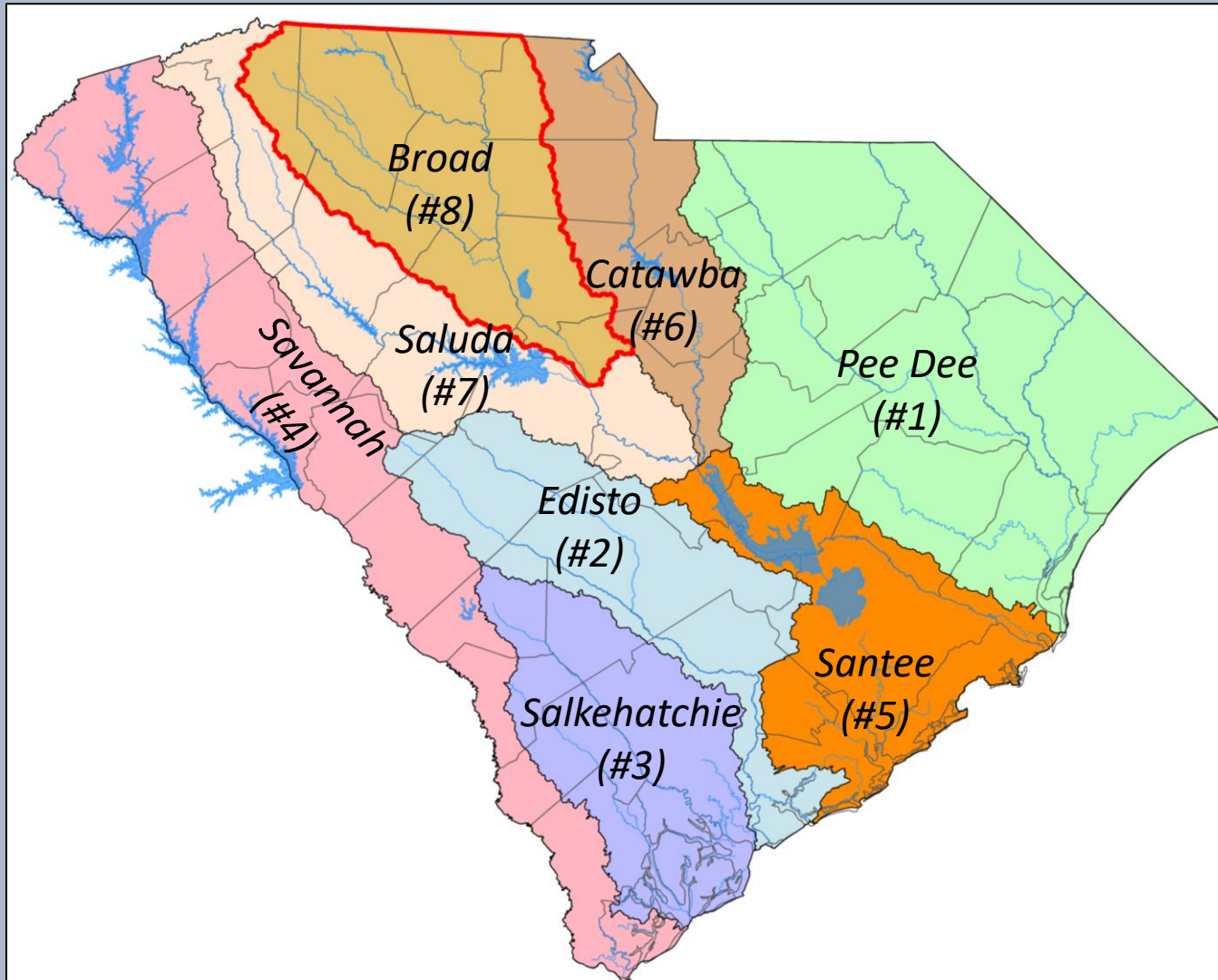


# Generalized Hydrogeologic Section through the State





# Groundwater Withdrawals in the State, 2021



## Groundwater withdrawals in 2021 (MGD)

Pee Dee 112.8 (40.5 %)

Edisto 60.5 (21.7 %)

Salkehatchie 38.6 (13.9%)

Savannah 36.3 (13.0 %)

Santee 18.4 (6.6 %)

Catawba 6.5 (2.3 %)

Saluda 5.1 (1.8 %)

Broad 0.5 (0.2 %)

Total 278.7

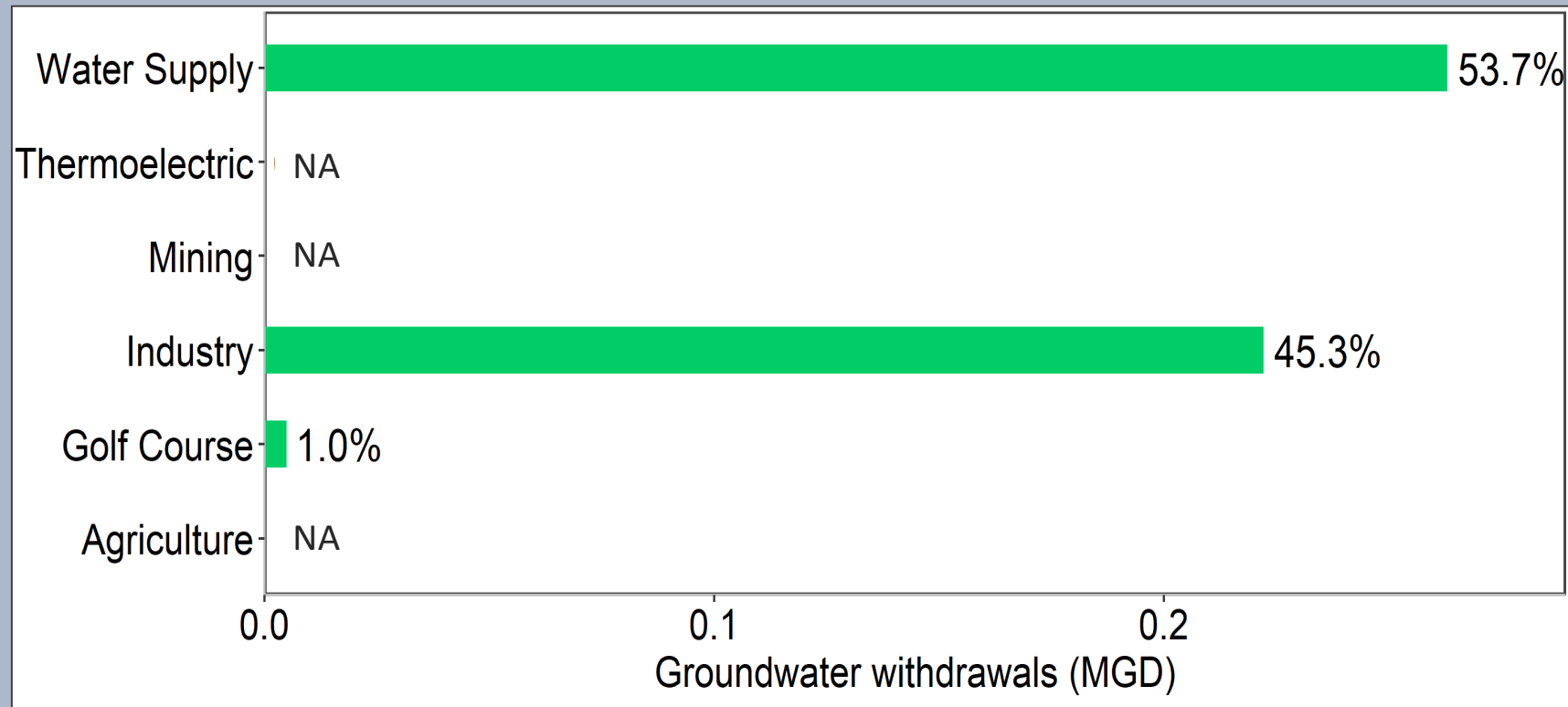


# Groundwater Use in the Broad Basin, 2021

Excluding Hydroelectric power:

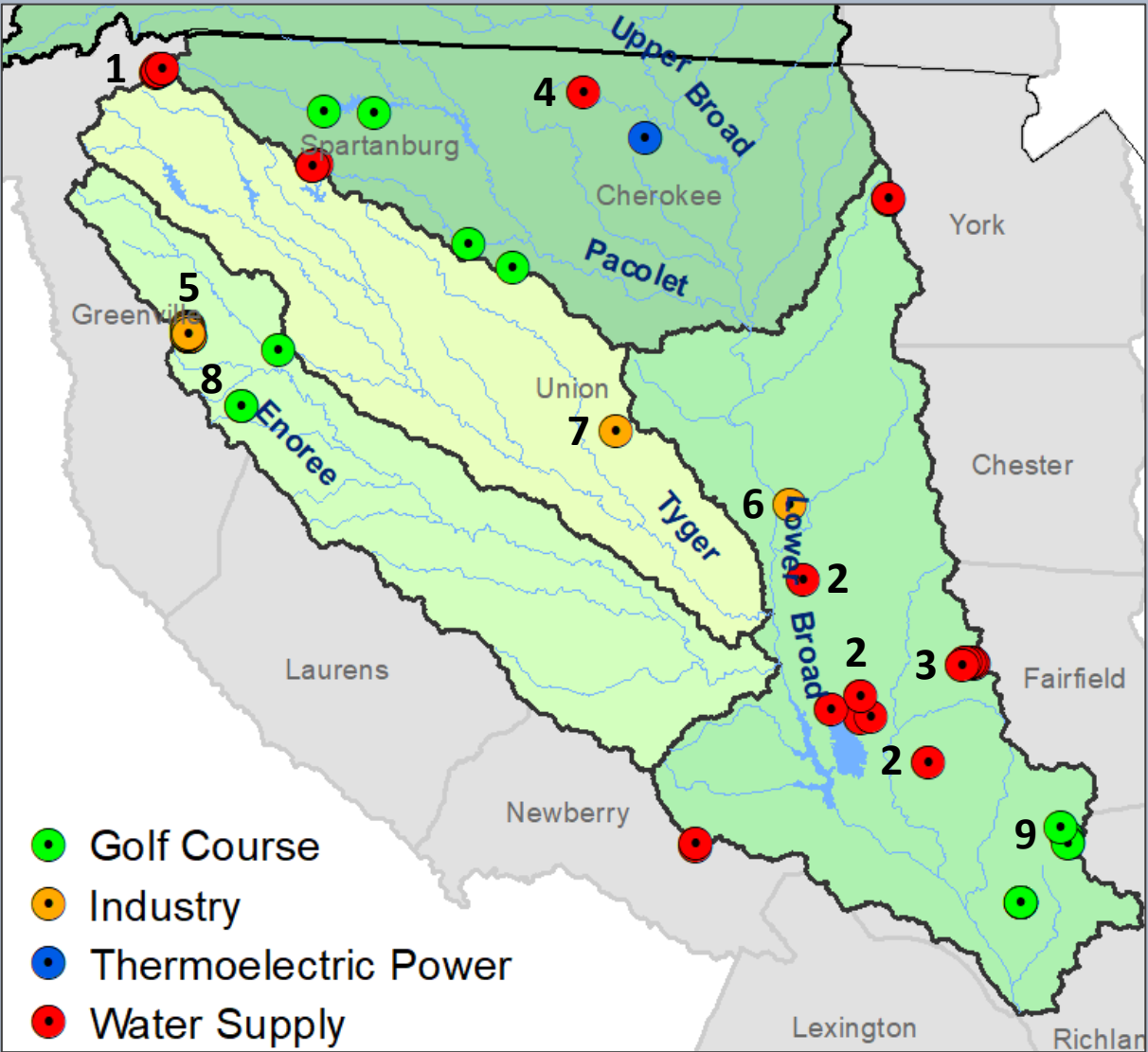
Surface water: 99.9 %

Groundwater: 0.1 %



Note: Cherokee Cogeneration Partners LLC has a groundwater well in the basin but had no reported use in 2021.

# Permitted Groundwater Withdrawers in the Broad Basin, 2021



Category	Facility	MGD
Water Supply	(1) Blue Ridge Rural Water Co. (9 wells)	0.1
	(2) Jenkinsville Water District (6 wells)	< 0.1
	(3) Mid County Water District #1 (5 wells)	< 0.1
	(4) Grassy Pond Water District (1 well)	< 0.05
Industry	(5) Greenville Gas Turbines, LLC (22 wells)	0.2
	(6) Chemtrade Performance Chemicals, US LLP Leeds Plant (1 well)	< 0.05
	(7) Timken Company (1 well)	< 0.05
Golf Course	(8) Fox Run Country Club (2 wells)	< 0.05
	(9) Cobblestone Park Golf Club (5 wells)	< 0.05

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# Piedmont Hydrogeologic Framework – A 2-Layered System

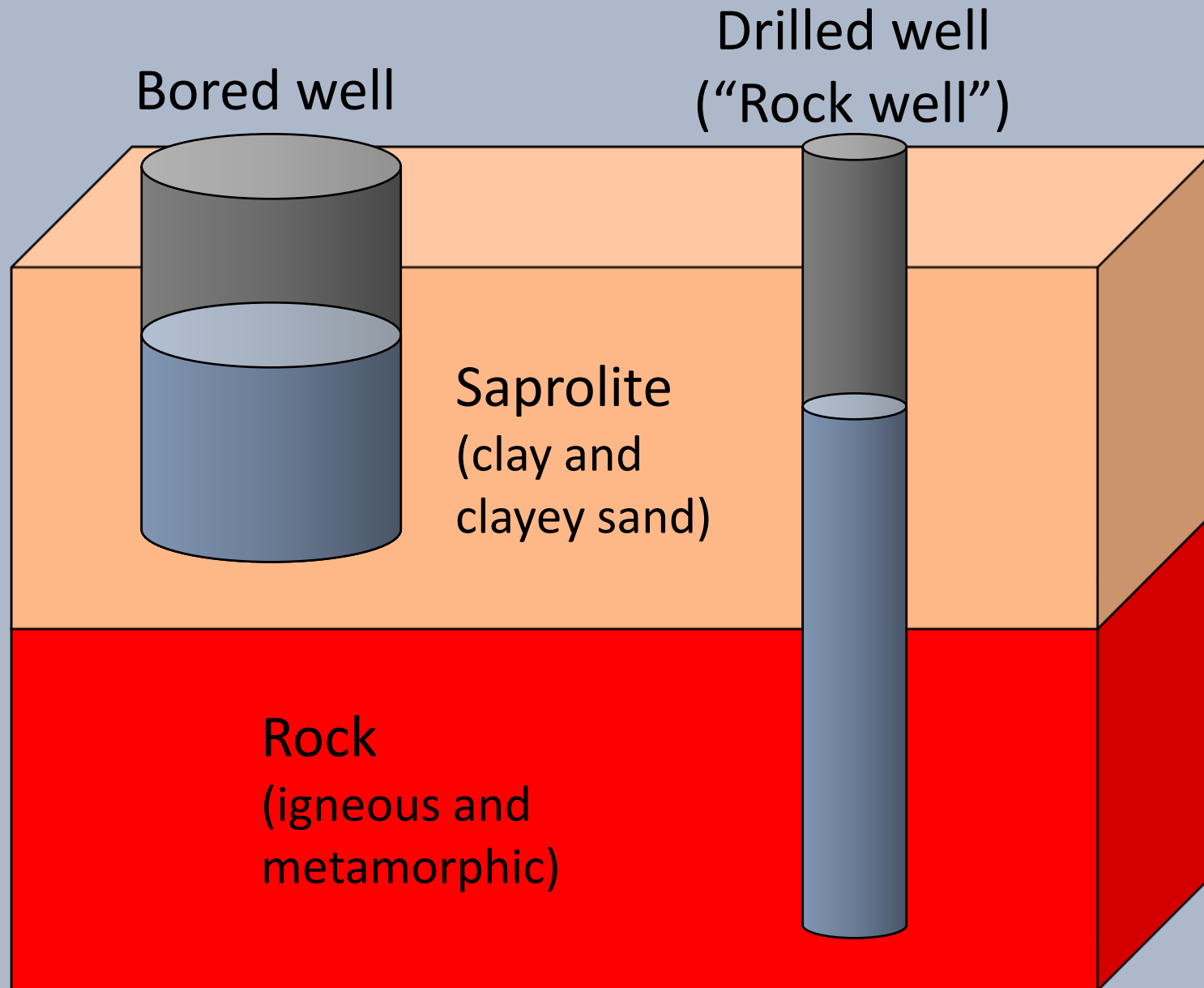
*Land Surface*

**Saprolite (Regolith)**: Granular sand and clay formed by the chemical and physical weathering of igneous and metamorphic rocks. High porosity but low permeability. Absorbs and stores rainwater and releases it to fractures in the underlying rock. 0-150 feet thick.

**Rock**: Hard, dense, practically impermeable igneous and metamorphic rocks that transmit water from the saprolite to natural discharge areas and to wells via fractures.

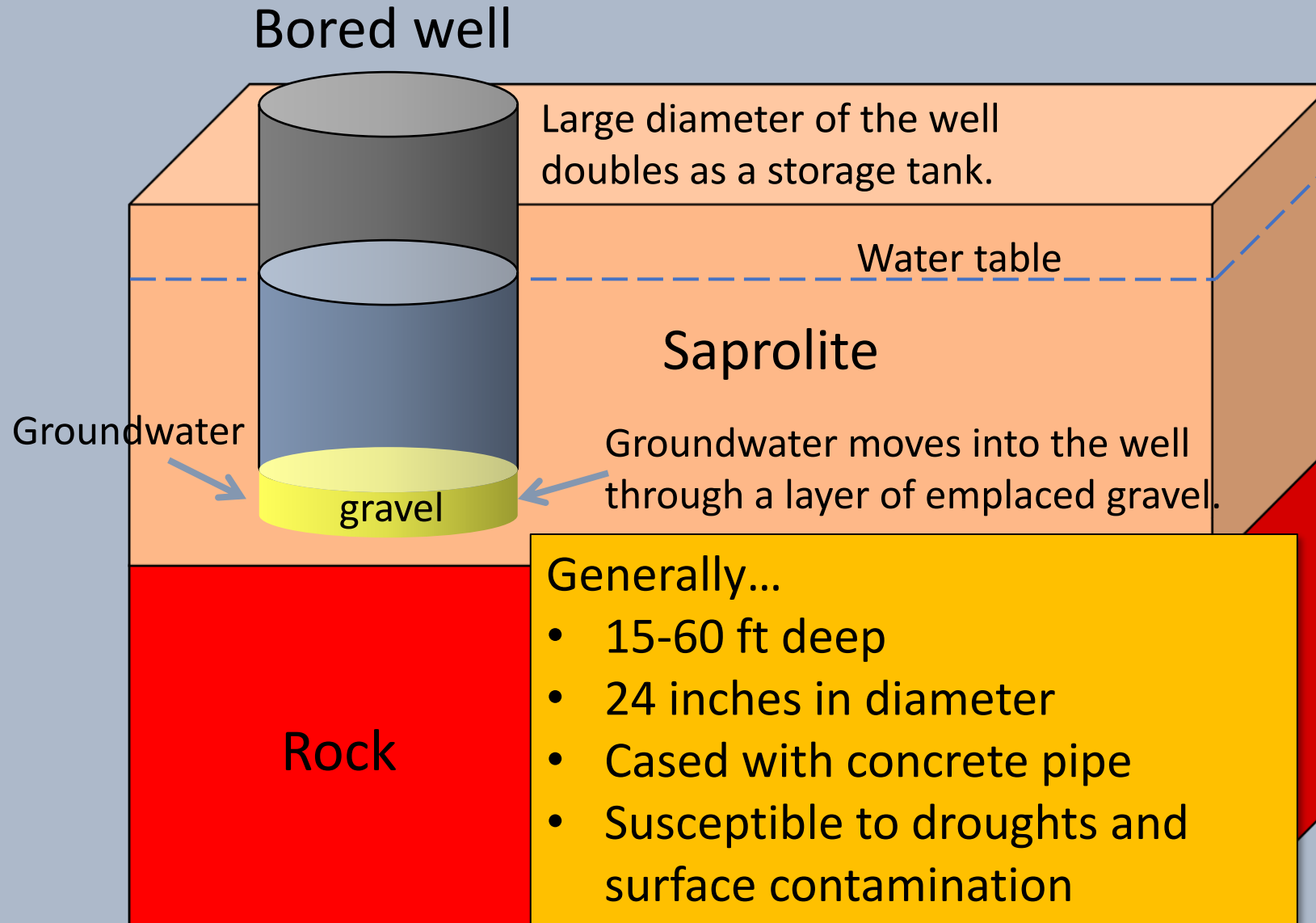


# Two Types of Wells – Bored and Drilled





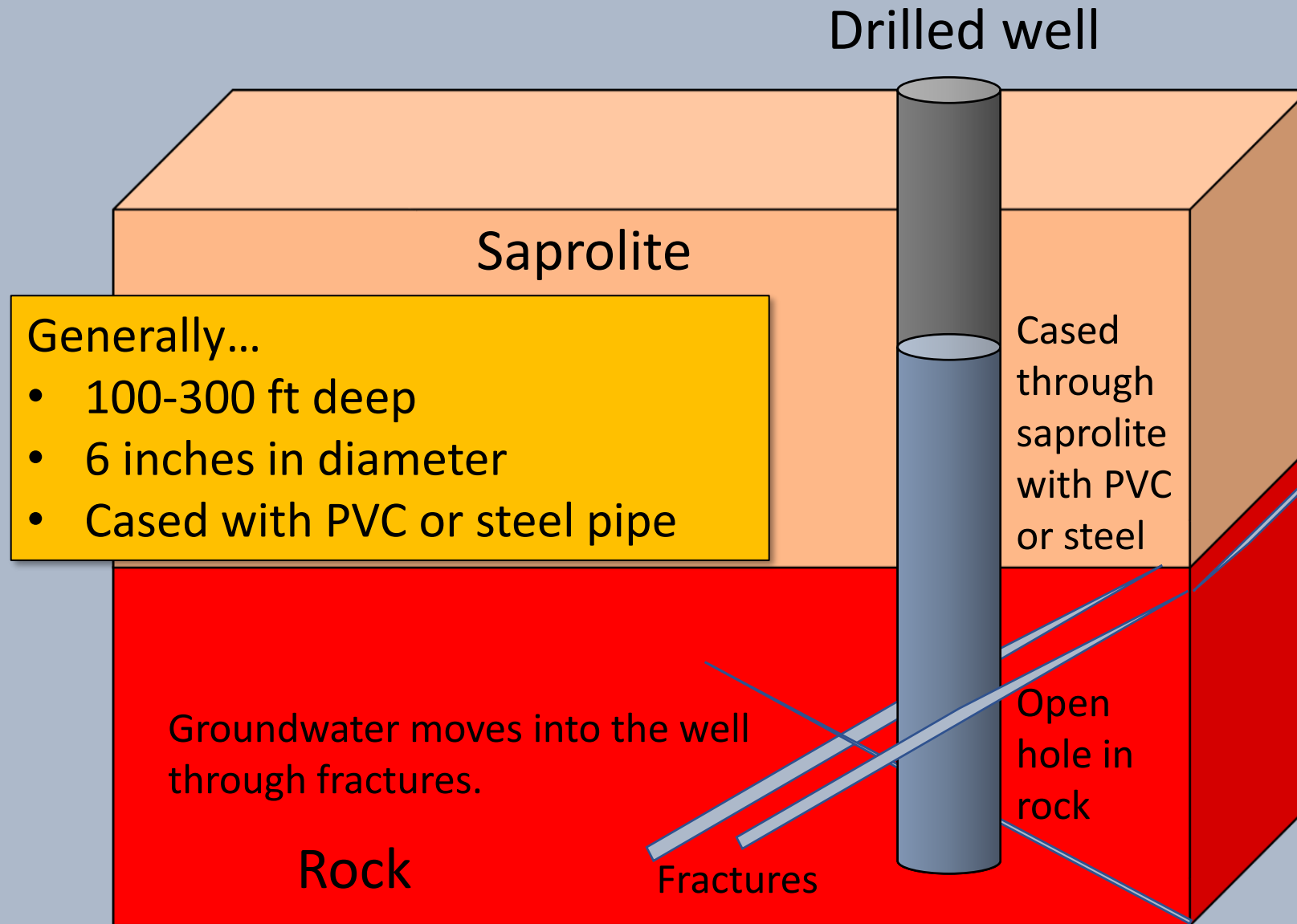
# Bored Wells in the Piedmont







# Drilled Wells in the Piedmont





# Well Depths and Yields by County in the Broad Basin

County	Well depth (feet)		Well yield (gpm)	
	Average	Maximum	Average	Maximum
Cherokee	236	1,185	15	200
Chester	213	585	17	360
Fairfield	251	610	21	200
Greenville	265	1,085	17	200
Laurens	273	905	16	150
Lexington	274	325	26	40
Newberry	234	880	15	250
Richland	292	884	24	200
<b>Spartanburg</b>	<b>278</b>	<b>1,200</b>	<b>20</b>	<b>370</b>
Union	276	1,000	14	100
York	220	745	16	300

Source: South Carolina State Water Assessment,  
Second Edition, 2009  
gpm, gallons per minute

In Spartanburg County, the average yield of drilled wells is 20 gallons per minute (gpm), but the median yield is only 7 gpm (Bloxham and others, 1970).

The average well depth is 278 ft, but most are less than 150 ft.

Well yields are low but are high enough to support most domestic use in the basin.

Domestic self-supplied groundwater withdrawals average about 5.34 mgd in Spartanburg County serving a population of approximately 53,000 people (approximately 18%) (USGS, 2015).



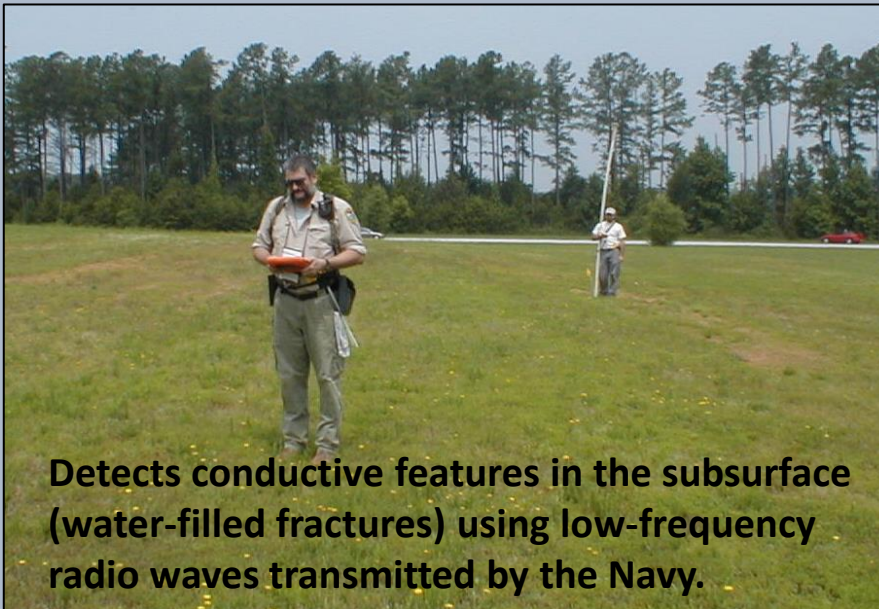
# Groundwater Yields in the Piedmont

- Yields are mainly a function of the number and size of fractures, and of the hydraulic connection between the fractures and saprolite.
- Higher yields are generally found:
  - in low lying areas, such as valleys and hillside ravines (draws) as opposed to hilltops and hillsides
  - where saprolite is thick
  - where wells penetrate certain geologic structures such as quartz veins, dikes, and lithologic contacts
  - in highly textured rocks, such as schists, as opposed to non-textured (massive) rocks, such as gneiss.
- Studies in North Carolina indicate that well yields increase with well diameter.



# Groundwater Yields in the Piedmont

- Efforts have been made to increase yields in existing wells using dynamite (did not work at a public supply well at Caesars Head State Park) and hydrofracturing (yields went from 1 gpm to 5 gpm at a domestic well in Greenville County).
- Efforts have been made using geophysics to identify areas that can produce high-yielding wells.



WADI Instrument





# Summary of Groundwater Availability in the Broad Basin

- Groundwater is the principal source of water for rural homes in the basin.
- Low to moderate yields can be obtained from wells across the entire basin.
- Yields can usually satisfy the requirements of most domestic use and some small irrigation and industrial use.



# References

Bloxham, W.M, Siple, George E, and Cummings, T. Ray, 1970, **Water Resources of Spartanburg County, South Carolina**: South Carolina Water Resources Commission Report 3, 112 p., 1 plate.

Daniel, Charles C., III, White, Richard K., and Stone, Peter A., eds., **Ground Water in the Piedmont: Proceedings of a Conference On Ground Water in the Piedmont of the Eastern United States**, October 16-18, 1989, Charlotte, N.C., 693 p.

Mitchell, H. Lee, 1995, **Geology, Ground Water, and Wells of Greenville County, South Carolina**: South Carolina Department of Natural Resources, Water Resources Report 8, 66 p., 1 plate.